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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,662	07/31/2001	Munehisa Horiguchi	EQU-C114	1521
7590 05/11/2004			EXAMINER	
LORUSSO & LOUD 3137 Mount Vernon Avenue Alexandria, VA 22305			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 05/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/917,662

Applicant(s)

HORIGUCHI ET AL.

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-14 and newly added claims 15-20. All of the claims are newly rejected under 35 USC §103, as necessitated by amendment. Accordingly, this action is made final.

Terminal Disclaimer

2. The terminal disclaimer filed on February 9, 2004 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,537,692 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Objections

3. Applicant is advised that should claim 11 be found allowable, claim 20 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

4. Claims 1, 3-7, 11, 14, 15, 17, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19648995 in view of Allen et al (U.S. Patent 4,293,396).

U.S. Patent 6,376,110 to Koschany is taken as an English-language equivalent of DE '995. Regarding claims 1 and 15, Koschany '110 is directed to a fuel cell comprising a proton exchange membrane electrolyte (4) and grooved bipolar separator plates (6) adjacent the cathode (2) (see abstract; Fig. 1). The grooves of the separator extend continuously in completely spanning the separator surface between the edges thereof. Hydrogen is supplied to the anode, while air is supplied to the cathode (see Fig. 1). Liquid water is sprayed from a nozzle (17) into the first end of the grooves and into contact with a surface of the cathode, thereby maintaining the electrolyte membrane in a moist condition (see Fig. 1; col. 5, line 53 et seq.). Regarding claim 15, the liquid water also evaporates in the flow passage (see col. 5, line 41). Regarding claims 3, 4, and 17, the optimum quantity of spray water is calculated as the quantity determined to maintain a proper moisture content within the electrolyte membrane and the amount of sprayed water is subsequently controlled (see col. 6, line 62 et seq.). Regarding claims 7 and 18, this quantity of water also maintains the temperature of the fuel cell within a predetermined temperature range (see col. 7, lines 6-10). Regarding claims 5 and 6, the water is sprayed directly onto the surface of the cathode and is dispersed over the entire surface thereof (see col. 5, line 32; col. 6, lines 55-61). Regarding claims 11 and 20, the membrane has a thickness that allows water to permeate therethrough (see col. 5, line 43). Regarding claim 14, the separator grooves are vertically oriented, whereby the supplied water falls by gravity in traversing the grooves (see Fig. 1).

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Koschany does not expressly teach that the cathode is provided with water repellency by providing it in the form of a carbon cloth embedded with PTFE, as recited in claims 1 and 15.

Allen et al. is directed to a gas-diffusion electrode for an electrochemical cell (see abstract). As described in column 3, line 50 et seq., the electrode comprises a carbon cloth embedded with TEFLON® (PTFE) and catalytic material.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the electrode of Allen as the cathode of Koschany. In column 5, line 41, Allen et al. teach the following:

in the case of the carbon paper substrate. While we do not wish to be held to any particular theory, it is plausible to attribute the improved performance of the electrodes of this invention to the uniformity of the catalyst layer evenly embedded within the cloth, to the short diffusion path of the gas to said even catalyst layer; to the more uniform and greater direct exposure of catalyst to the gas; and to the lower electric resistivity of the substrate compared to that to the Teflon-coated hydrophobic paper substrate. The cloth-based electrodes are also somewhat stiffened and are not fragile and retain mechanical stability and electrochemical performance over thousands of operating hours. The catalytic carbon-to-carbon cloth binding involved in this structure moreover, provides the further desirable attribute of similar temperature coefficients of expansion and contraction resulting in mechanical integrity.

As such, the artisan would be motivated to use the electrode of Allen as the cathode of Koschany in hopes of obtaining these advantages.

5. Claims 2 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19648995 in view of Allen et al. as applied to claims 1, 3-7, 11, 14, 15, 17, 18, and 20 above, and further in view of Sanderson et al (U.S. Patent 5,085,949).

DE '995 (Koschany '110) does not expressly teach that the quantity of water sprayed is controlled in response to the output voltage of the fuel cell, as recited in claims 2 and 16.

Sanderson et al. is directed to a fuel cell generation system wherein an abnormal state in the cooling unit is detected based on the output voltage of the fuel cell (see abstract).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to control the quantity of water of the system of Koschany in response to the output voltage of the fuel cell. In column 5, line 20, Sanderson et al. teach that "the system is capable of rapidly and positively detecting an abnormal state where the upper stacked cell temperature rises to a predetermined temperature or more. It results in preventing the breakdown of the cell caused when the system is kept operating the abnormal state and offering a great effect in light of safety of the fuel cell and plant operation." Accordingly, the artisan would be motivated to control the quantity of water of the system of Koschany in response to the output voltage of the fuel cell.

6. Claims 8, 9, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19648995 in view of Allen et al. as applied to claims 1, 3-7, 11, 14, 15, 17, 18, and 20 above, and further in view of JP 5-29013.

DE '995 (Koschany '110) does not expressly teach that the quantity of water sprayed is controlled in response to the output power of the fuel cell, as recited in claims 8, 9, and 19.

In the abstract, JP 5-29013 discloses a fuel cell system in which the flow rate of the cooling water is controlled in response to the output power of the fuel cell.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to control the quantity of water of the system of Koschany in response to the output power of the fuel cell. In the abstract, JP '013 teaches that the power generation system is operated "optimally" by controlling it in this manner. Accordingly, the artisan would be motivated to control the quantity of water of the system of Koschany in response to the output power of the fuel cell.

7. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19648995 in view of Allen et al. as applied to claims 1, 3-7, 11, 14, 15, 17, 18, and 20 above, and further in view of Watkins et al (U.S. Patent 5,200,278).

Regarding claim 13, DE '995 (Koschany '110) further teaches in column 7, line 15 that the air/water mixture leaving the cathode is recirculated.

However, the reference does not expressly teach that water is separated from the cathode exhaust gas, as recited in claim 12.

In column 8, line 61 et seq., Watkins et al. teach a water separator (174) which removes the water from the cathode exhaust stream (170).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to separate the water from the cathode exhaust gas of Koschany before recirculating the water to the nozzle. In column 3, line 6, Watkins et al. teach that "[w]hen using substantially pure reactants, the unconsumed reactants exiting the fuel cell stack are recirculated to minimize waste. Water in the gas stream exiting the fuel cells is accumulated in a separator or knockout drum, where the water can be recirculated and used as a coolant or drained from the system." Accordingly, the artisan would be motivated to separate the water from the cathode exhaust gas of Koschany before recirculating the water to the nozzle.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19648995 in view of Allen et al. as applied to claims 1, 3-7, 11, 14, 15, 17, 18, and 20 above, and further in view of Kleinberger et al (U.S. Patent 5,350,117).

DE '995 (Koschany '110) does not expressly teach that water is sprayed at a predetermined constant pressure over a predetermined time, as recited in claim 10.

In column 1, line 58, Kleinberger et al. teach a humidifying apparatus in which water is sprayed at constant pressure for predetermined cycle periods.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to spray the water of Koschany at predetermined constant pressure for a predetermined time. In column 1, line 55, Kleinberger et al. describe this arrangement as "preferred." Furthermore, in column 10,

line 52, the reference teaches that “[s]ince the amount of water pressure affects the quality of mist emitted from the mist nozzles 59, the pressure regulator 901 and the feedback line 92 help to ensure optimum mist quality.” Accordingly, the artisan would be motivated to spray the water of Koschany at predetermined constant pressure for a predetermined time.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

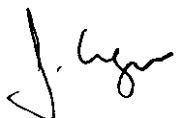
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Patent Examiner
Art Unit 1746
May 7, 2004